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(54) Abstract Title: Folding door which can allow both parts to pivot about the main axis

(57) A folding door comprises two door sections 30,32 hinged together along one edge 34,36, with the main pad hinged to the frame at its opposite edge C. The second section is connected to the top of the doorframe 28 by a sliding pivot member 80, so it can pivot about a second axis parallel to the main axis, and move along the upper frame 28. This pivot 80 can be released, so that the door may be opened as a single wing, with both sections pivoting about the main axis. The release lever may be operated electrically or manually, possibly using a coin. The sliding pivot member may be a pin, biased into the upper track by a coil spring.

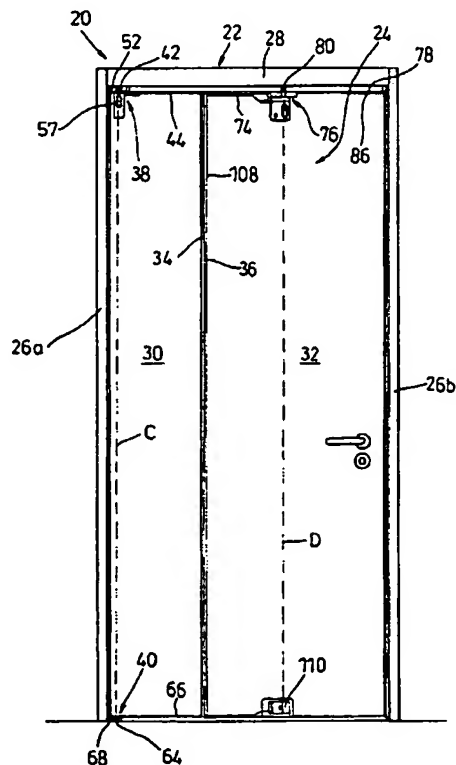
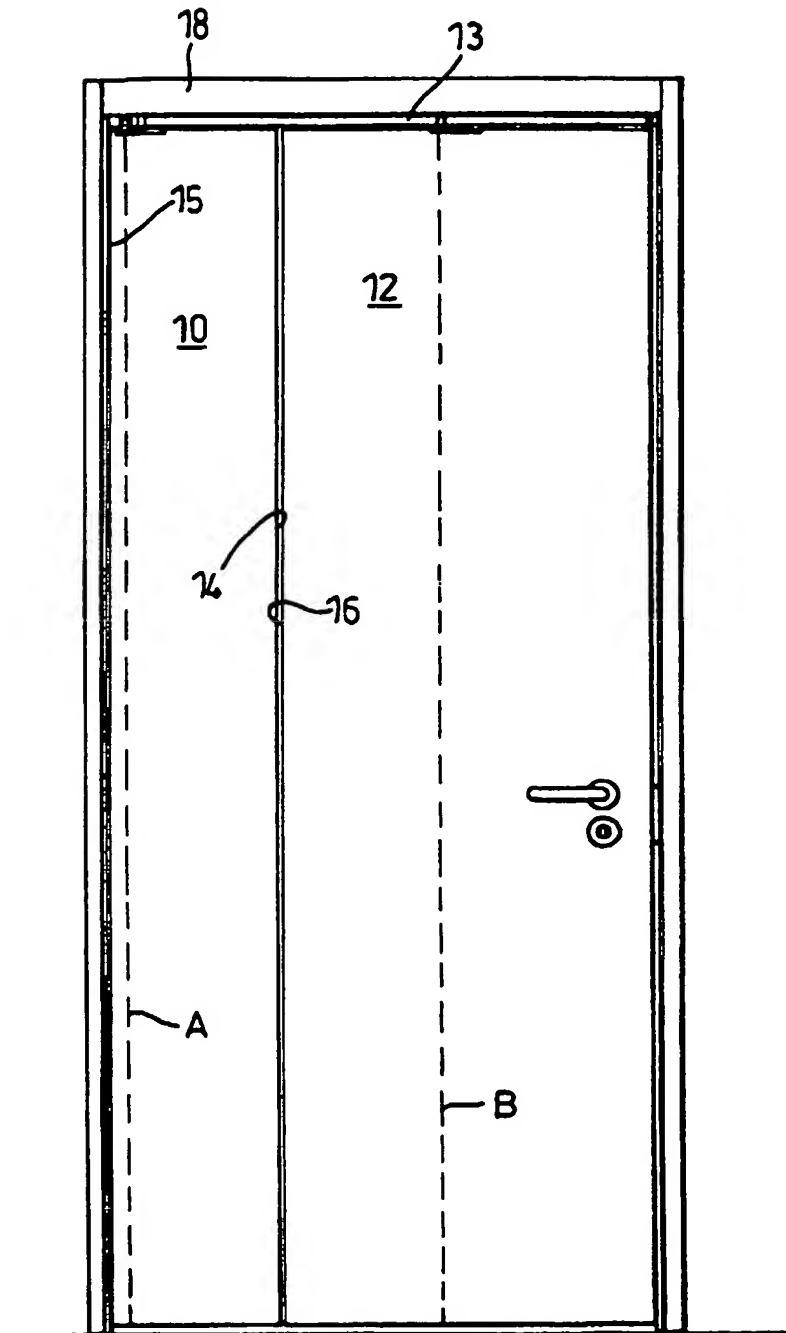


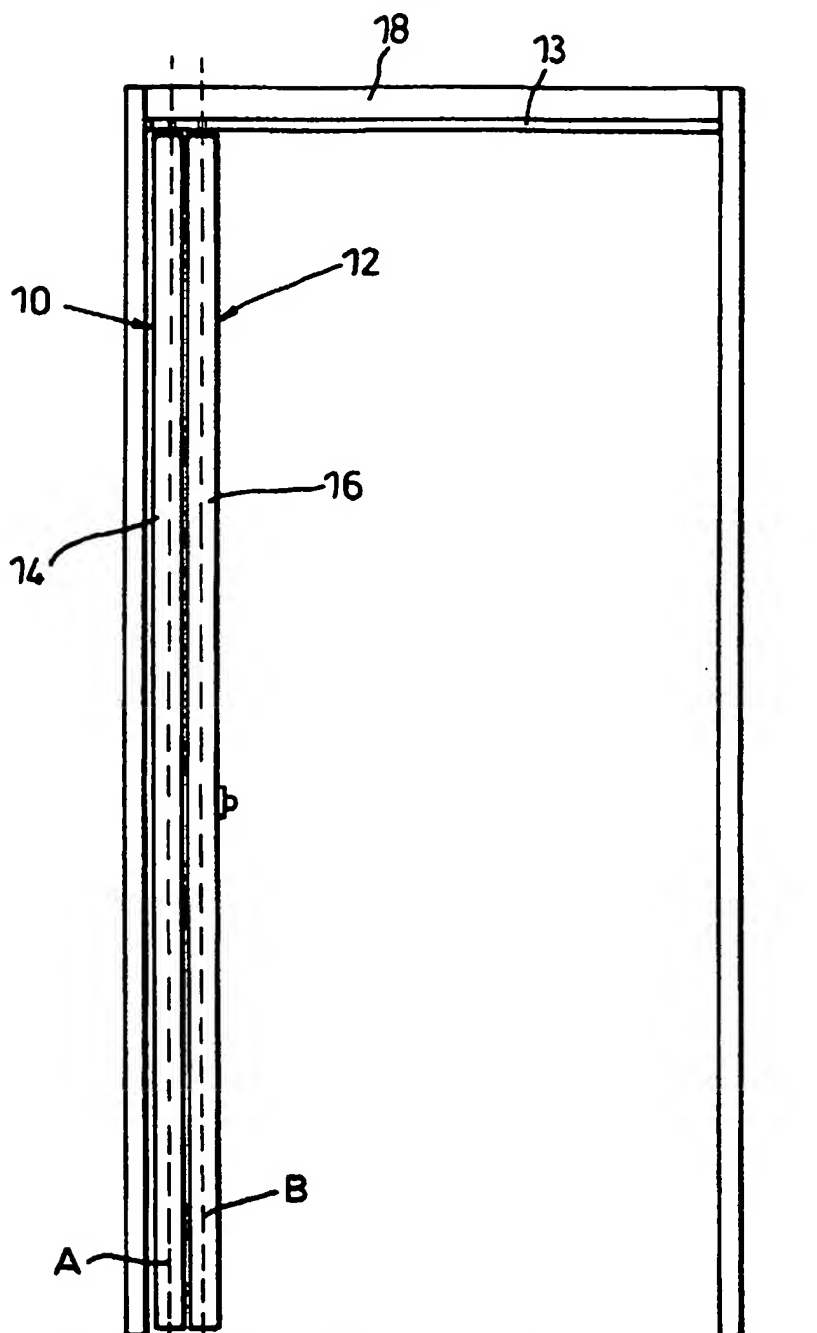
Fig. 3

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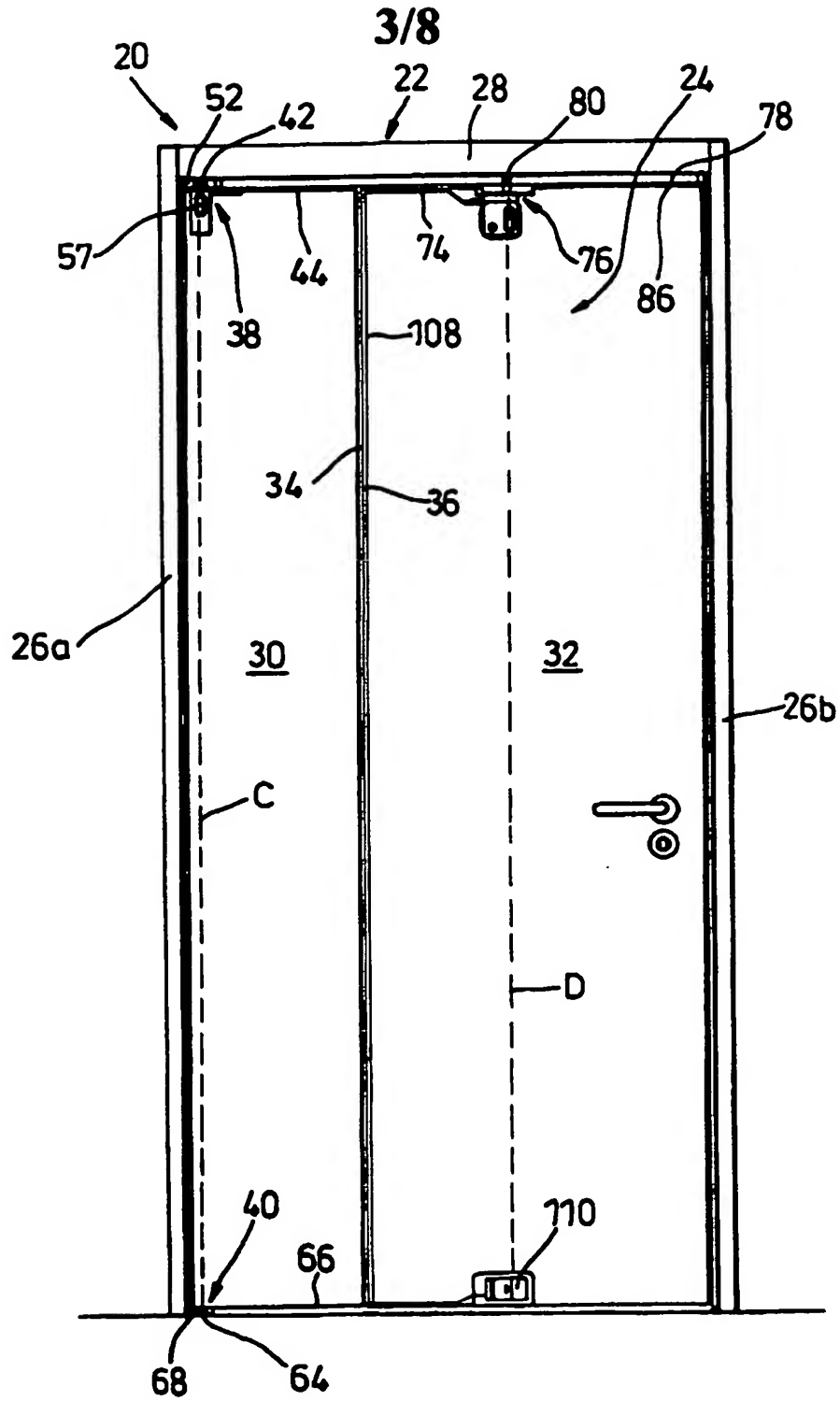


**Fig. 1**

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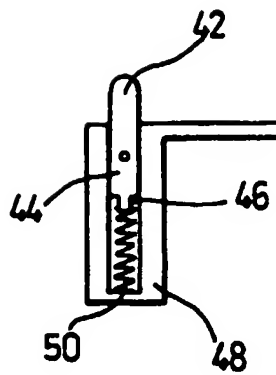


**Fig. 2**

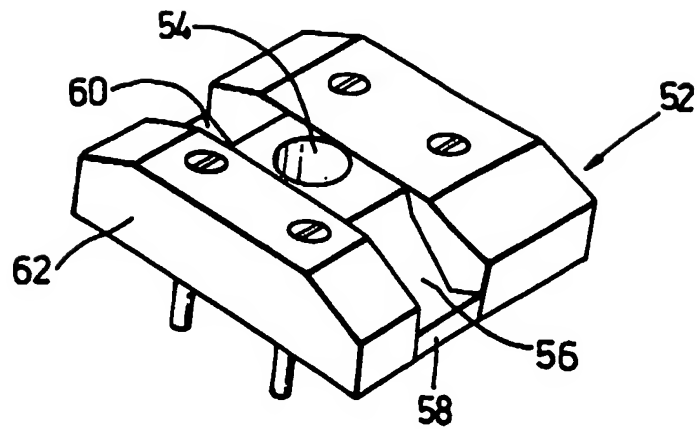


**Fig. 3**

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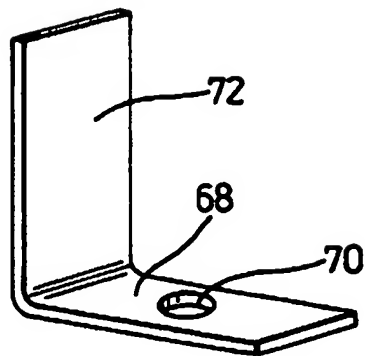
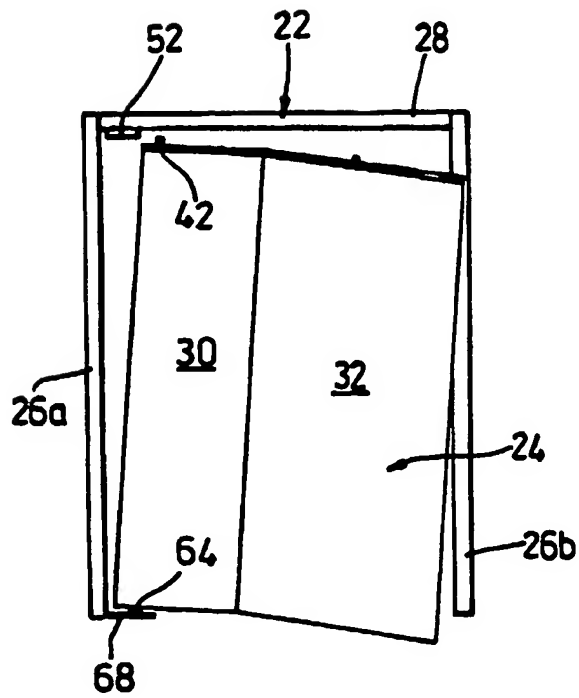
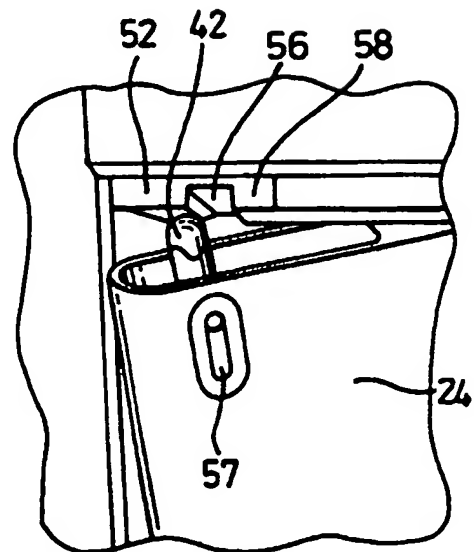


**Fig. 4**

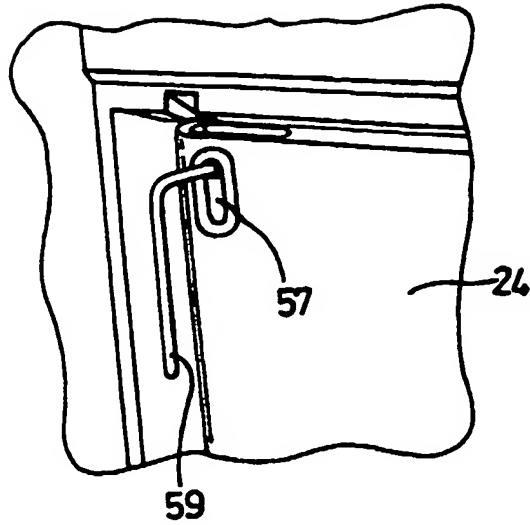


**Fig. 5**

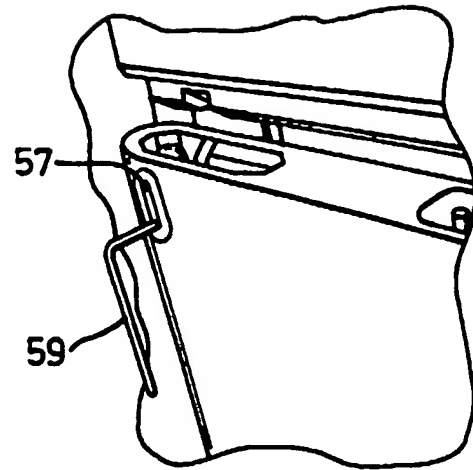
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**Fig. 6****Fig. 7****Fig. 8**

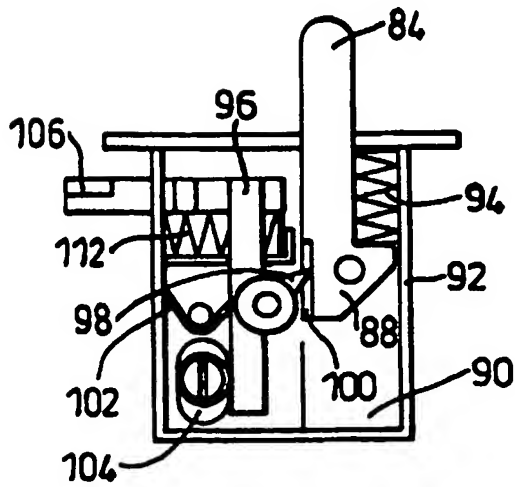
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**Fig. 9**

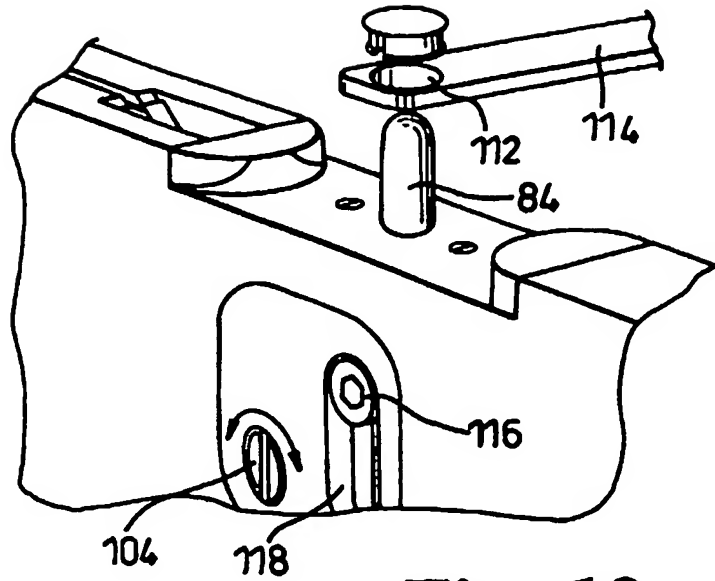


**Fig. 10**

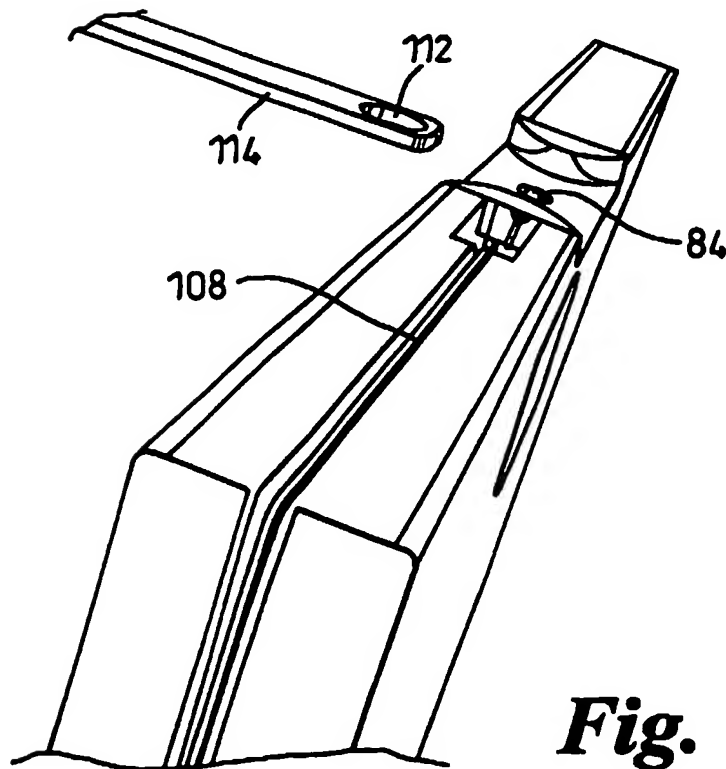


**Fig. 11**

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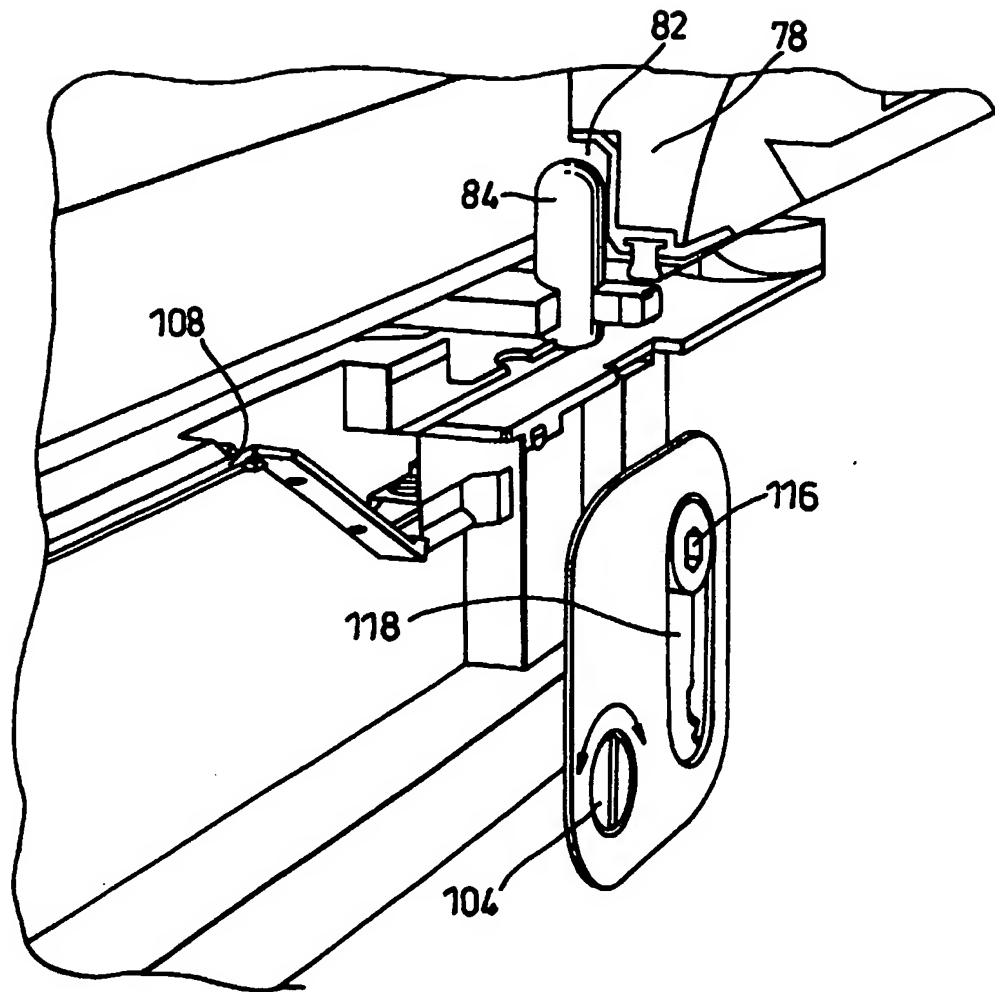
**Fig. 12**



**Fig. 13**



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**Fig. 14**

## DOOR ASSEMBLY

The present invention relates to a "wide" door assembly and, in particular, to a "wide" door assembly having an emergency release mechanism.

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Typically "wide" door assemblies have two doors, each one being pivotally attached to opposite sides of a door frame.

10 A "wide" door may however be pivotally connected to one side of a door frame if the door frame is intermediate those normally associated with a double swing door and a single door.

One particular type of a "wide" door that is pivotally connected to one side of a door frame is constructed from two door sections 10,12 hingedly  
15 connected along adjacent edges 14,16 in a side-by-side arrangement, as shown in Figure 1. One of the door sections 10 is pivotally mounted towards one edge 15 in a door frame 18 such that the door section 10 is pivotal about a first, vertical axis A, generally parallel to the adjacent edges 14,16 of the door sections 10,12. The other of the door sections 12 is  
20 pivotally connected to a track 13 extending across at least part of the top of the door frame 18 such that the door section 12 is pivotal about a second, vertical axis B, and is slidable along the track 13. This mounting arrangement means that, on opening, the door effectively slides and folds to its open position, as shown in Figure 2, and therefore requires less space in  
25 which to open than a conventionally hinged door. It also means that, in its open position, the door handle is positioned closer to the door opening than it would be on a conventional door, thereby making it easier to reach from the door opening once someone has passed therethrough.

30 In use, pivotal movement of the second door section 12 is usually away

from a user on entry into a room. In the event that the user encounters difficulties after passing through and locking the door, it may be difficult to open the door from the outside, particularly if the user is laid against the inside of the door, for example.

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The pivotal mounting of the first door section 10 means that if the pivotal connection between the second door section 12 and the track 13 is released, the first and second door sections 10,12 may be pivoted outwards, rather than inwards, to permit access to the room.

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The provision of the hinge between the first and second door sections 10,12 means that, in such instances, the second door section 12 may be manipulated such that it may be moved sideways, away from the adjacent jamb post of the door frame, before being pivoted to its open position. This avoids the need to release the latch mechanism between the second door section and the adjacent jamb post since it enables the latch on the second door portion to be pulled out of engagement with the latch receiving means provided on the jamb post.

15

20 However the step of releasing the pivotal connection between the second door section 12 and the track 13 generally requires the use of one or more tools, such as screw drivers and or spanners, and cannot be effected by an incapacitated user from within the room.

25 An object of the invention is to provide a release mechanism that permits release of the pivotal connection between the second door section and the track.

30 According to an aspect of the invention there is provided a door assembly comprising a door frame having a pair of opposed side frame members and

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an upper frame member extending between said side frame members, a door having first and second door sections hingedly connected along adjacent edges in a side-by-side manner widthwise of the door, said first door section being hingedly mounted for movement about a main hinge axis, said second  
5 door section being connected to the upper frame member by a pivot assembly which constrains the second door section to pivot about a pivot axis parallel to the main hinge axis and also permits said pivot axis to move along the upper frame, and release means operably connected to the pivot assembly, the release means, when actuated, causing the pivot assembly to  
10 disconnect said second door section from said upper frame member.

The provision of release means enables the door to be opened by disconnecting the pivotal connection between the second door section and the upper frame member without the need for one or more tools.

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The release means is preferably operable from both sides of the door defined by the first and second door sections such that the pivotal connection may be disconnected from either side of the door.

20 The release mechanism may be manually or electrically operable, and may including biasing means and a release lever operably associated with the pivot assembly such that on actuation of the release lever the pivot assembly disconnects the second door section from the upper frame member.

25 The release lever may be actuatable by means of a rotatable cam member.

The rotatable cam member is preferably rotatable by means of a coin.

The use of a coin-actuated release lever restricts access to the door to  
30 prevent accidental opening of the door by releasing the pivotal connection

between the second door section and the track, and is preferably located to be accessible from the exterior of the room.

Alternatively, or in addition, the release lever may be actuatable by means  
5 of a handle and a release cable connected between the release lever and the handle.

The use of a handle-actuated release lever enables relatively easy operation of the release mechanism, and requires no additional components such that  
10 a user located behind the door could operate it. The handle is preferably located so that it is accessible from within the room.

In a particularly preferred embodiment, the release lever may be actuated from one side of the second door section by means of a coin, and from the  
15 other side of the second door section by means of a handle and a release cable connected between the release lever and the handle.

Other advantageous features are defined in dependent Claims 8-14.

20 An embodiment of the invention will now be described, by way of non-limiting example, with reference to the accompanying drawings in which:

Figures 1 and 2 show a "wide" door assembly;

25 Figure 3 shows a door assembly according to an embodiment of the invention;

Figure 4 shows a first hinge component of the door assembly of Figure 1;

30 Figure 5 shows a second hinge component of the door assembly of Figure 1;

Figure 6 shows a fourth hinge component of the door assembly of Figure 1;

Figures 7 and 8 illustrate steps of the installation procedure of the door  
5 assembly of Figure 1;

Figures 9 and 10 illustrate removal of the door from the door frame of the  
door assembly of Figure 1;

10 Figure 11 show a track follower of the door assembly of Figure 1;

Figures 12 and 13 illustrate further steps of the installation procedure of the  
door assembly of Figure 1; and

15 Figure 14 shows a sectional view of the connection between the second  
section of the door and the upper frame member of the frame of the door  
assembly of Figure 1.

A door assembly 20 according to an embodiment of the invention is shown  
20 in Figure 3.

The door assembly 20 includes a door frame 22 and a door 24 pivotally  
mounted in the door frame 22 for movement about a main hinge axis C.

25 The door frame 22 includes two opposed side frame members 26a,26b and  
an upper frame member 28 extending between the side frame members  
26a,26b.

The door 24 is constructed from first and second door sections 30,32 which  
30 are located side by side widthwise of the door 24 and which are hingedly

connected to one another along adjacent edges 34,36.

Upper and lower hinge assemblies 38,40 are spaced along the main hinge axis C for constraining the first door section 30 to hinge about the main hinge axis C.

The upper hinge assembly 38 includes a first hinge component in the form of a resiliently movable pivot pin 42 (Figure 4) protruding from an upper edge 44 of the first door section 30.

The pivot pin 42 is received at one end 44 within a channel 46 defined in a housing 48 located within the first door section 30.

The length of the channel 46 is preferably chosen such that, in a retracted position, the pivot pin is received wholly within the channel 46. The pivot pin 42 is biased from its retracted position to a position where it extends from the upper edge 44 of the first door section 30. Preferably the pivot pin 42 is biased by means of a spring 50 received in the channel 46.

The upper hinge assembly 38 also includes a second hinge component in the form of a guide block 52, as shown in Figure 5.

The guide block 52 is formed to define a recess 54 shaped to receive the pivot pin 42 forming the first hinge component. The guide block 52 is mounted on an upper frame member 28 of the door frame 22 such that the recess 54 faces, and is axially aligned with, the pivot pin 42.

Preferably a chamfer 56 is formed in one edge 58 of the guide block 52, adjacent the recess 54. The chamfer 56 defines a ramp sloping away from the recess 54. Preferably a chamfer 60 is also formed in the opposite edge

62 of the guide block 52, adjacent the recess 54. The chamfer 60 defining a ramp sloping away from the recess 54 on the opposite side of the guide block 52.

- 5 Preferably neither of the chamfers 56,60 extends along the entire length of the respective edge 58,62 of the guide block 52. In this way, non-chamfered portions of the respective edges 58,62 on each side of the chamfers 56,60 serve to define a guidance channel towards the recess 54.
- 10 The lower hinge assembly 40 includes a third hinge component in the form of a fixedly secured pivot pin 64 protruding from a lower edge 66 of the first door section 30 in axial alignment with the resiliently movable pivot pin 42.
- 15 The lower hinge assembly 40 also includes a fourth hinge component in the form of a fulcrum plate 68, as shown in Figure 6.

The fulcrum plate 68 formed to define a recess 70 that is shaped to receive the pivot pin 64 forming the third hinge component. The fulcrum plate 68  
20 includes a bracket 72 extending generally perpendicular thereto from one end. The bracket 72 is secured to a respective side frame member 26a of the door frame 22 with the fulcrum plate 68 lying flat on the floor such that the recess 70 faces, and is axially aligned with, the pivot pin 64.

- 25 On installation of the first door section 30 within the door frame 22, the pivot pin 64 forming the third hinge component is engaged within the recess 70 formed in the fulcrum plate 68.

Engagement of the pivot pin 70 with the fulcrum plate 68 defines a fulcrum  
30 about which the first door section 30 may be pivoted, and enables a user to



push the first door section 30 towards an upright position, as shown in Figure 7.

5 This causes lateral movement of the pivot pin 42 forming the first hinge component relative to the guide block 52 allowing the pivot pin 42 to be moved into alignment with the chamfer 56 formed on the first edge 58 of the guide block 52.

10 Once the pivot pin 42 is aligned with the chamfer 56, as shown in Figure 8, further movement of the pivot pin 42, in a lateral direction relative to the guide block 52 pushes the pivot pin 52 against the chamfer 56. This causes the pivot pin 42 to react against the biasing maintaining it in its extended position, and causes the pivot pin 42 to retract, allowing it to travel up the ramp defined by the chamfer 56.

15 The non-chamfered portions of the edge 58 of the guide block 52 preferably serve to ensure that the pivot pin 42 travels up the ramp defined by the chamfer 56 and into the recess 54 defined behind the chamfer 56.

20 When the pivot pin 42 reaches the recess 54, the biasing returns the pivot pin 42 to its extended position bringing the pivot pin 42 into engagement with the recess 54.

25 The combination of the biasing of the pivot pin 42 and the chamfer 56 thereby facilitate automatic inter-engagement of the first and second hinge components such that the first door section 30 is pivotally mounted within the door frame 22.

30 In order to enable removal of the first door section 30 at a later stage, should it become necessary, a slot 57 is preferably formed in the side of the first

door section 30 permitting access to the bottom of the pivot pin 42, as shown in Figures 9 and 10. This enables a user to insert an appropriate tool 59 (Figure 9) and pull the pivot pin 42 downwards against the biasing, and into its retracted position (Figure 10). The first door section 30 can then be removed.

Preferably the pivot pin 42 is lockable in its extended position such that once the first door section 30 is mounted, the pivot pin 42 can be locked to prevent unwanted removal of the first door section 30.

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The second door section 32 is connected at its upper edge 74 to the upper frame member 28 of the door frame 22 by a pivot assembly 76 which constrains the second door section 32 to pivot about a pivotal axis D parallel to the main hinge axis C, and enables the pivotal axis D to move along the upper frame member 28.

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The pivot assembly 76 includes a guide track 78 mounted on the upper frame member 28 of the door frame 22 and a track follower 80 mounted on the second door section 32.

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The guide track 78 is an elongate member defining an elongate recess 82 (Figure 14) along the length thereof.

To simplify the positioning of the guide track 78 relative to the guide block 52 forming the second hinge component, on the upper frame member 28 of the door frame 22, the guide track 78 is preferably formed integrally with the guide block 52.

25

The track follower 80 includes a resiliently movable pivot pin 84 (Figure 9) protruding from an upper edge 86 of the second section 32 of the door 24.

30

The pivot pin 84 is received at one end 88 within a channel 90 defined in a housing 92 located within the second section 32 of the door 24.

- 5 The length of the channel 90 is chosen such that, in a retracted position, the pivot pin 84 is received wholly within the channel 90. The pivot pin 84 is biased from a position where it extends from the upper edge 86 of the second section 32 of the door 24 to its retracted position. Preferably the pivot pin 84 is biased by means of a spring 94 received in the channel 90.

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A release lever 96 is pivotally mounted within the housing 92. The release lever 96 includes a protruding engagement member 98 fixedly secured thereto that is engageable with a slot 100 formed in the pivot pin 84.

- 15 The release lever 96 is biased to an upright position by means of a spring 102. In this position, the engagement member 98 engages the slot 100 in the pivot pin 84, maintaining the pivot pin 84 in its extended position.

- On pivotal movement of the release lever 96 in an anti-clockwise direction,  
20 the engagement member 98 disengages the slot 100. The biasing provided by spring 102 causes retraction of the pivot pin 84.

- Pivotal movement of the release lever 96 may be effected by means of a coin-operated cam member 104 located adjacent one end of the release  
25 lever 96, or a linkage member 106 operably associated with the opposite end of the release lever 96.

- The linkage member 106 is preferably operated by means of a cable 108 (Figure 3) secured between the linkage member 106 and a handle 110  
30 (Figure 3) provided on the interior surface of the second section 32 of the

door 24.

In another arrangement, the cable 108 may extend between the linkage member 106 and the handle 110 via a bore extending through the door 24.

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The handle 110 is preferably located on what in use is intended to be the internal surface of the door, and towards what in use is intended to be the bottom edge of the door 24 such that it can be operated by a user laid on the floor.

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The linkage member 106 is preferably biased by means of a spring 112 to ensure that, on release of the handle 110, the linkage member 106 returns the release lever 96 to its upright position where it can be re-engaged with the pivot pin 84.

15

During installation of the door 24 in the door frame 22, the release lever 96 may be disengaged from the slot 100 in the pivot pin 84 by operation of the coin-operated cam member 104, for example. This causes retraction of the pivot pin 84, by virtue of spring 102, such that the pivot pin 84 is received

20 wholly within the channel 90 defined in the housing 92.

Once the first section 30 of the door 24 is pivotally mounted in the door frame 22 by means of the upper and lower hinge assemblies 38,40, the track follower 80 in the form of pivot pin 84 may be aligned with the elongate recess 82 of the track 78. In this position, an aperture 112 formed in the end of a door closure rod 114 (Figures 12 and 13) of a conventional door closure mechanism (not shown) may also be aligned with the pivot pin 84. An appropriate tool, such as an allen key, may then be engaged with a bolt 116 secured to the bottom end of the pivot pin 84 and received in a slot 118

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30 formed in the second section 32 of the door 24 enabling the pivot pin 84 to

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be pushed upwards. This in turn pushes the pivot pin 84 through the aperture 112 formed in the end of the door closure rod 114, and into engagement with the elongate recess 82 (Figure 14). Whilst the pivot pin 84 is held in this position, the coin-operated cam member 104 may be re-aligned to return the release lever 96 to its vertical position such that when  
5 the pivot pin 84 is released it engages the engagement member 98. This in turn maintains the pivot pin 84 in its extended position, and in engagement with the elongate recess 82.

10 On actuation of the release lever 96, by means of the coin-actuated cam member 104 or the release cable 108, the pivot pin 84 is returned to its retracted position by the biasing provided by spring 102. This serves to disengage the pivot pin 84 from the elongate recess 82 of the track 78, and the aperture 112 formed in the end of the door closure rod 114.

15

In other embodiments, the door closure mechanism may be omitted from the assembly.

## CLAIMS

1. A door assembly comprising a door frame having a pair of opposed side frame members and an upper frame member extending between said side frame members, a door having first and second door sections hingedly connected along adjacent edges in a side-by-side manner widthwise of the door, said first door section being hingedly mounted for movement about a main hinge axis, said second door section being connected to the upper frame member by a pivot assembly which constrains the second door section to pivot about a pivot axis parallel to the main hinge axis and also permits said pivot axis to move along the upper frame, and release means operably connected to the pivot assembly, the release means, when actuated, causing the pivot assembly to disconnect said second door section from said upper frame member.
2. A door assembly according to Claim 1 wherein said release means is operable from both side of said door.
3. A door assembly according to Claim 1 or Claim 2 wherein said release means is manually operable.
4. A door assembly according to Claim 1 or Claim 2 wherein said release means is electrically operable.
5. A door assembly according to any preceding claim wherein said release means includes biasing means and a release lever operably associated with said pivot assembly such that on actuation of said release lever said pivot assembly disconnects said second door section from said upper frame member.

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6. A door assembly according to Claim 5 wherein said release lever is actuatable from the exterior of said door by means of a coin.
7. A door assembly according to Claim 5 or Claim 6 wherein said release  
5 lever is actuatable from the interior of said door by means of a handle and a release cable connected between said release lever and said handle.
8. A door assembly according to Claim 7 wherein said handle is located in a lower region of said door.
- 10
9. A door assembly according to any preceding claim wherein said first door section includes upper and lower hinge assemblies spaced along the main hinge axis for constraining the first door section to hinge about said main hinge axis, the upper assembly including first and second hinge  
15 components which, when inter-engaged in an axially aligned position move relative to one another about said main hinge axis, the first hinge component being mounted on the first door section and the second hinge component being mounted on the frame, the first and second hinge components being automatically inter-engageable by moving them, in a  
20 lateral direction relative to said main hinge axis, into axial alignment, the lower hinge assembly including third and fourth hinge components which co-operate to define a fulcrum about which the door may be pivotally moved in a lateral direction relative to said main hinge axis when said first and second components are not inter-engaged, and also co-operate to define  
25 a hinge for constraining movement of said first door section about said main hinge axis when said first and second hinge components are inter-engaged, the upper and lower hinge assemblies thereby enabling the first door section to be hingedly mounted relative to the door frame by initially engaging the third and fourth hinge components and moving the first door section about  
30 said fulcrum to move the first and second hinge components in a lateral

( direction relative to the main axis and thereby cause the first and second hinge components to automatically inter-engage in said axially aligned position.

- 5 10. A door assembly according to Claim 9 wherein said first hinge component includes a resiliently movable pivot pin and said second hinge component includes a guide block chamfered on one edge, at least in part, that automatically locates said pivot pin in a recess formed in said guide block on movement of said pivot pin relative to said guide block.
- 10 11. A door assembly according to Claim 10 wherein said guide block is chamfered on opposite sides thereof.
12. A door assembly according to any preceding claim wherein said pivot  
15 assembly includes a guide track mounted on said upper frame member and a track follower mounted on the second door section, the track follower and guide track being co-operable.
13. A door assembly according to Claims 10 and 12 wherein said guide  
20 block and said guide track are formed integrally.
14. A door assembly according to Claims 10 wherein said pivot pin is spring biased from a retracted position to an extended position.
- 25 15. A door assembly generally as herein described with reference to and/or as illustrated in the accompanying drawings.



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